Sub D1

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18. (Amended) The method of claim 37, wherein the oligomers independently comprise subunits selected from the group consisting of deoxyribonucleotides, ribonucleotides, and analogs of deoxyribonucleotides or ribonucleotides; and any single oligomer comprises one or a combination of two or more of said different types of subunits.

(3) Claim 19 is amended as follows:

19. (Amended) The method of claim 37 wherein each of said oligomers forming said content addressable memory matrix T_{ij} comprises, in order from the 5' end to the 3' end, (a) an oligomer strand comprising a nucleotide sequence representing an i-th component of $\boldsymbol{V}$ selected from the group consisting of E_i and $\underline{E}i$ for $i = 1$ to $i = m$, (b) an oligomer strand comprising a nucleotide sequence representing a j-th component of $\boldsymbol{V}$ selected from the group consisting of E_j and $\underline{E}_j$ for $j = 1$ to $j = m$, wherein $j \neq i$, and (c) a nucleotide sequence F that is not complementary to any sequence E_i or $\underline{E}_i$ for $i = 1$ to $i = m$.

(4) Claims 20-21 are canceled without prejudice or disclaimer.

(5) Claim 22 is amended as follows:

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22. (Amended) The method of claim 37 wherein said single-stranded oligomers comprising a complete, substoichiometric set of E_i of step (c) and E_i are anchored to a solid support.

(6) Claim 27 is amended as follows:

Sub i K3

27. (Thrice Amended) The method of claim 9 wherein said operation of matrix or vector algebra is determining the inner product of two vectors $\boldsymbol{V}$ and $\boldsymbol{W}$, and said method comprises:

(i) obtaining for each vector $\boldsymbol{V}$ and $\boldsymbol{W}$, sets of single-stranded oligomers E_i and $\underline{E}_i$ representing the components of the vector, wherein the concentrations of the oligomers E_i and $\underline{E}_i$ are proportional to the absolute values of the amplitudes of the components they represent; and

also obtaining a set of single-stranded oligomers E_i and $\underline{E}_i$ representing the components of vector $\underline{\boldsymbol{W}}$ that are complementary to said oligomers representing vector $\boldsymbol{W}$, wherein the relative concentrations of the oligomers representing $\underline{\boldsymbol{W}}$ are proportional to the concentrations of their complementary oligomers in $\boldsymbol{W}$;

(ii) combining samples of the oligomers representing vector $\boldsymbol{V}$ with samples of the oligomers representing vectors $\boldsymbol{W}$ and $\underline{\boldsymbol{W}}$ in separate respective first and second reaction mixtures and measuring R_+. and R_- rates of hybridization associated with the respective first and second mixtures, and obtaining a numerical value proportional to the inner product of the two vectors from a difference between said R_+ and R_- rates of hybridization.

(7) Add new claim 36 as follows:

Sub i K4

36. (New) The method of claim 9, wherein said operation of matrix or vector algebra includes obtaining an outer product matrix of two vectors V_i for $i = 1, 2, ..., m$, and W_j for $j = 1, 2, ..., n$,

wherein said step of subjecting comprises obtaining a set of dimeric, single-stranded oligomers to represent an outer product of vectors V and W, each of said dimeric oligomers comprising (i) a first single-stranded oligomer sequence selected from the group consisting of E_i or $\underline{E}_i$ for each i-th component of V for $i = 1, 2, \ldots m$, which oligomer is joined at its 3' end to the 5' end

of (ii) a second single-stranded oligomer sequence selected from the group consisting of E_j or $\underline{E}_j$ for each j-th component of W for all j = 1, 2, ... n,

wherein the step of detecting includes determining the concentration of said dimeric oligomers comprising oligomer sequences corresponding to the i-th component of V and the j-th component of W.

(8) Add new claim 37 as follows:

Sub C1

37. (New) A method for obtaining a data set V_i^b from an oligomer-based, content-addressable memory following input of a data set U_i^b that represents a portion of V_i^b,

wherein data elements in the form of m-component vectors $\boldsymbol{V} = \sum_i V_i \mathbf{e}_i$ are represented in the memory by a set of the oligomers E_i and $\underline{E}_i$ that are a subset of all single-stranded oligomers and are in 1:1 correspondence with the basis vectors $\mathbf{e}_i$ for i = 1, 2, ...m in an abstract m-dimensional vector space;

wherein oligomers E_i and $\underline{E}_i$ have complementary nucleotide sequences, with E_i oligomers representing the i-th component of $\boldsymbol{V}$ for which the amplitude V_i is positive, and $\underline{E}_i$ representing the i-th component of $\boldsymbol{V}$ for which V_i is negative; and

wherein the concentration of each of oligomers E_i and $\underline{E}_i$ is proportional to the absolute value of the amplitude V_i of the i-th component of $\boldsymbol{V}$;

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the method comprising:

(a) preparing a content-addressable memory representing memory matrix T_{ij} in which are stored data sets corresponding to vectors V_i^a for a = 1 to a = n, where i = 1, 2, ..., m, wherein T_{ij} is

the sum of all of the outer products $V_i^a V_j^a$ for $i \neq j$, the preparing of the memory representing the matrix T_{ij};

comprising obtaining for each vector V^a a set of dimeric single-stranded oligomers, each of which comprises a first single-stranded oligomer sequence selected from the group consisting of E_i or $\underline{E}_i$ for each i-th component of V^a for $i = 1$ to $i = m$, and further comprises a second single-stranded oligomer sequence selected from the group consisting of E_j or $\underline{E}_j$ for each j-th component of V^a for $j = 1$ to $j = m$, except for $i = j$; and then pooling said sets of dimeric oligomers obtained for each vector V^a for $a = I$ to $a = n$ to form the set of oligomers of the content-addressable memory representing the matrix T_{ij};

(b) combining said pool of dimeric oligomers with a set of oligomers representing partial data Set U_i^b under conditions wherein oligomer sequences E_i^b and $\underline{E}_i^b$ of data set U_i^b hybridize specifically to complementary sequences E_j and $\underline{E}_j$ present in said memory pool oligomers; and obtaining an isolated set of monomeric oligomer strands X_i comprising the first single strand oligomer sequences E_i and $\underline{E}_i$ of said memory pool of dimeric single stranded oligomers that hybridized specifically to said U_i^b oligomers, wherein said X_i oligomers do not further comprise said E_j and $\underline{E}_j$ oligomers of the second single-stranded sequences of said memory pool oligomers that are complementary to said U_i^b oligomers;

(c) combining said set of X_i oligomers with a set of single-stranded saturating oligomers comprising a set of E_i and $\underline{E}_i$ oligomers representing the complete set of basis vectors $\mathbf{e}_i$ for $i = 1$ to m, wherein the E_i and $\underline{E}_i$ oligomers are substoichiometric relative to said set of X_i oligomers, in that the number of oligomers in the set of X_i oligomers is greater than the number of saturating oligomers, so that complementary sequences hybridize to each other, denaturing the resulting duplex

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molecules, and isolating the subset of X_i oligomer that hybridized specifically to said E_i and $\underline{E}_i$ sequences, to obtain a set of saturated X_i strands, S(Xi);

(d) repeating steps (b) and (c) iteratively, using the set of saturated X_i strands, $S(X_i)$ obtained in each previous implementation of step (c) as the set of oligomers representing partial data set U_i^b employed in the subsequent implementation of step (b), until successive iterations yield the same set of oligomer strands X_i produced by step (b) that represents data set V_i^b.

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